# Biomass Research and Development

# Technical Advisory Committee

## August 14–15, 2013

***Meeting Summary***

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## List of Acronyms

ASTM – American Society for Testing and Materials
AUD – advanced uniform design
BER – Biological and Environmental Research
Biomass Act – Biomass Research and Development Act of 2000
BLM – Bureau of Land Management
BRC – Biomass Research Center
BRDI – Biomass Research and Development Initiative
CAAFI – Commercial Aviation Alternative Fuels Initiative
CLEEN – Continuous Lower Energy, Emission and Noise
Committee – Biomass R&D Technical Advisory Committee
D&D – Demonstration and Deployment
DOE – Department of Energy
DOI – Department of the Interior
DOT – Department of Transpiration
DPA – Defense Production Act
EISA – Energy Independence and Security Act of 2007
EMSL – Environmental Molecular Sciences Laboratory
EPA – Environmental Protection Agency
F2F2 – Farm to Fly 2.0
FAA – Federal Aviation Administration
FCEA – Food, Conservation, and Energy Act of 2008
FOA – Funding Opportunity Announcement
GGE – gallon of gasoline equivalent
GREET – Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation
GW – gigawatts
IBRs – integrated biorefineries
JGI – Joint Genome Institute
MOU – Memorandum of Understanding
NEPA – National Environmental Policy Act
NIFA – National Institute of Food and Agriculture
NSF – National Science Foundation
REAP – Rural Energy for America Program
RFI – Request for Information
USDA – U.S. Department of Agriculture
USN – U.S. Navy

# I. Purpose

On August 14–15, 2013, the Biomass Research and Development Technical Advisory Committee (the Committee) held its third quarterly meeting of 2013. The Committee received updates about the Department of Energy's (DOE's) Bioenergy Technologies Office (BETO), and U.S. Department of Agriculture (USDA) representatives delivered presentations about current agency activities, as well as the Biomass Research and Development Initiative (BRDI). Overviews of biomass-related research at the Federal Aviation Administration (FAA), Department of Interior (DOI), and the DOE Bioenergy Science Centers were provided, along with a panel on federal initiatives for aviation fuels given by the U.S. Navy, USDA, and DOE.

See Attachment A for a list of meeting attendees. See Attachment B to review the meeting agenda. Meeting presentations can be viewed on the BRDI website: http://biomassboard.gov/committee/meetings.html.

**Background:** The Committee was established by the Biomass Research and Development Act of 2000 (Biomass Act), which was repealed and replaced by Section 9008 of the Food, Conservation, and Energy Act of 2008. The Biomass Research and Development Board (the Board) was established under the same legislation to coordinate activities across federal agencies. The American Taxpayer Relief Act of 2012, Title VII—Extension of Agricultural Programs, Sec. 701. "1-Year Extension of Agricultural Programs," subsection (f) Energy Programs, Paragraph 7 on "Biomass Research and Development" extended Section 9008 through 2013. The Committee is tasked with advising the Secretary of Energy and the Secretary of Agriculture on the direction of biomass research and development (R&D).

# II. Welcome

*Ronnie Musgrove, Committee Co-Chair*
*Kevin Kephart, Committee Co-Chair*

Mr. Musgrove and Mr. Kephart welcomed the Committee to the third meeting of the year and called the meeting to order.

# III. Committee Business for 2013 and U.S. Deparment of Energy Updates

*Elliott Levine, U.S. Department of Energy, Designated Federal Official*

Mr. Levine provided the Committee with some overview and background information. Mr. Levine then provided an update on recent BETO activities, including the Waste-to-Energy Request for Information (RFI) Data Analysis, the Natural Gas-Biomass to Liquids Workshop, the Incubator Program, and carbon fiber activities. BETO is also revisiting its Multi-Year Program Plan and expects the updated plan to be made available in December 2013.

Mr. Levine also provided the Committee with updates on recent funding opportunity announcements (FOAs):

- On July 1, 2013, BETO announced the selection of four projects for negotiation under the CHASE Bio-Oil FOA.
- At Biomass 2013, Secretary Moniz announced selection for the Advanced Biomass Feedstock Logistics Systems solicitation. The project awardee, FDC Enterprises, will reduce harvesting, handling, and preprocessing costs across the entire biomass feedstock supply chain.
- Secretary Moniz also announced selections for the Algae Biofuel Yield FOA. Awards were given to Hawaii, Sapphire Energy, New Mexico State University, and California Polytechnic State University.
- Four awards have been given to the Clean Biomass Cookstoves opportunity. Awards were given to the University of Washington, Aprovecho, Oak Ridge National Laboratory, and Lawrence Berkeley National Laboratory.
- DOE made a 2012 BRDI award for $5.8 million to Humboldt State University for its project, "Waste to Wisdom: Utilizing forest residues for the production of bioenergy and biobased products."

Other updates from Mr. Levine included the following:

- The Biomass 2013 conference occurred July 31-August 1, 2013, at the Washington Convention Center. This year's event focused on celebrating successes, current trends and frontiers, as well as highlighting sustainability and biorefinery projects. Secretary of Energy Ernest Moniz and Secretary of Agriculture Tom Vilsack both delivered keynote speeches at the event. The final attendee list reached nearly 500 registrants, which included members of government, academia, and industry.
- On July 30, 2013, BETO held its Program Management Review. Results from the May 2013 Project Peer Review were highlighted, and the overall focus and proposed future direction for the Office were reviewed. The final summary report is expected to be released within the next few months.
- There have been staff changes at BETO. These include the following:
    - Kevin Craig, Program Manager, Conversion
    - Jim Spaeth, Acting Program Manager, Demonstration and Deployment
    - Neil Rossmeissl, Program Manager, Algae
- Secretary Moniz reorganized DOE, resulting in the Office of the Under Secretary for Science and Energy.
- On July 31, 2013, the Federal Register Notice, soliciting nominations for new Committee candidates, was released.

## IV. U.S. Deparment of Agriculture Updates

*Todd Campbell, U.S. Department of Agriculture*

Mr. Campbell provided updates from USDA on the following topics:

- Biorefinery Assistance Program
  - The Sapphire Energy algae-to-crude oil project in New Mexico has paid off a $54.5 million loan guarantee; it has been in continuous operation since May 2012.
  - The Freemont Community Digester is fully operational.
  - INEOS Bio in Vero Beach, Florida, is producing cellulosic ethanol at commercial scale; the first ethanol shipments will be released in August.

- BioPreferred Program
  - Designated eight new biobased product categories for preferred federal procurement, including: aircraft and boat cleaners; automotive care products; engine crankcase oil; gasoline fuel additives; metal cleaners and corrosion removers; microbial cleaning products; paint removers; and water turbine bearing oils.
  - There are now 97 designated categories representing approximately 10,000 unique product types.
  - Reopened the Web portal for companies to apply for the voluntary USDA Certified Biobased Product label.
  - Nine hundred individual products have received the USDA Certified Biobased Product label.

- Solicitation Update
  - Section 9002—open
  - Section 9003—expected to open the program in the near future
  - Section 9004—unfunded for 2013
  - Section 9005—contract application period closed
  - Section 9007—solicitation closed; state awards expected in the near future
  - Section 9008—unfunded for 2013
  - Section 9011—unfunded for 2013

- Farm Bill Title IX Update
  - Mr. Campbell provided a side-by-side comparison on the House and Senate changes to the Farm Bill.

- Climate Change Adaptation/Mitigation
  - New threats have been observed in recent years: increased risk of severe wildfire, more intense storms, and problems from invasive pests. USDA announced the creation of seven new “regional climate hubs” to provide farmers/ranchers with regionally appropriate information to adapt to climate change.

## V. Overview of Selected Biomass Research & Development Programs

- *Federal Aviation Administration, James Hileman, Chief Scientific and Technical Advisor for Environment and Energy*
- *Department of Interior, Ned Farquhar, Deputy Assistant Secretary for Land and Minerals Management*
- *Bioenergy Science Centers, Sharlene Weatherwax, Associate Director of Science for Biological and Environmental Research, U.S. Department of Energy*

Mr. Hileman provided the first overview of the FAA alternative jet fuel activities. He first described the Aviation Environmental challenges, including community noise, air quality, water quality, energy usage, and climate change. He stated that environmental impacts from aviation could pose a critical constraint on capacity growth, but alternative jet fuels could reduce the environmental impact of aviation. The United States is pursuing a multi-pronged approach to address greenhouse gas emissions from aviation, which includes the following:

- Aircraft and Engine Technology Improvement
- Operational Improvements
- Alternative Fuels Development and Deployment
- Policies, Environmental Standards, and Market-Based Measures
- Scientific Understanding through Research, Modeling, and Analysis.

Challenges to alternative jet fuels include feedstock availability, competitive cost for alternative fuel, performance/safety approval, environmental sustainability, and commercial production.

FAA works with other agencies across the entire biofuels supply chain. Our primary efforts focus on fuel testing with a particular focus on informing American Society for Testing and Materials (ASTM) approval, environmental and cost analysis, and government and industry coordination.

In the area of testing, FAA provides material compatibility, certification/qualification, and emissions measurements. FAA conducts analyses of environmental sustainability, economics of fuel production, and future scenarios. FAA also provides interagency, state and regional, and international coordination. A key component to the coordination activities is the Commercial Aviation Alternative Fuels Initiative (CAAFI)—a public-private coalition for commercial aviation to engage the emerging alternative fuels industry.

Future FAA activities include the Center of Excellence for Alternative Jet Fuel and Environment, which is on schedule to be operational in 2013. Another is the second phase of the Continuous Lower Energy, Emissions and Noise (CLEEN) program, which plans to release a solicitation in 2014.

Government and industry leadership has led to significant successes, including the following:

- Drawing focus to aviation
- Aerospace manufacturers acceptance of alternative fuels

- ASTM approvals of two alternative jet fuel pathways
- Inclusion of alternative jet fuels in life-cycle models (GREET) and RFS
- Increased interagency coordination and collaboration.

Mr. Hileman concluded by saying that alternative jet fuels are a key component of FAA's strategy to meet environmental goals. FAA efforts are directed at overcoming key challenges via testing, analysis, and coordination. Finally, CAAFI—a public-private partnership—is helping to catalyze promising, renewable jet fuel technologies.

Steve Csonka shared that two jet fuel conversion pathways have been approved. The Air Force played a large role in the first pathway. The Navy played a larger role in the second pathway. Mr. Hileman also added that all pathways provide more than just jet fuel.

Mr. Ned Farquhar, Deputy Assistant Secretary for Land and Minerals Management at DOI, provided the next agency overview. DOI has a varied mission that includes conservation, recreation, cultural, historical, energy, water, and lands. DOI plays an active role in the President's "all-of-the-above" strategy on energy. Specifically, DOI works to accelerate clean energy production, expand and modernize the grid, understand impacts on our resources, and protect natural systems. With regard to the President's energy challenge goal of 20 gigawatts (GW) by 2020, DOI met the 10-GW goal in October 2012 with a total of 13.3 GW approved to date. The offshore wind potential in the Atlantic is more than current U.S. electric generation. Onshore renewable energy resources approved by DOI include the following:

- Forty-seven projects since 2009 (13.3 GW):
    - Twenty-five solar (8 GW)
    - Ten wind (4.7 GW)
    - Twelve geothermal (0.6 GW).

With respect to woody biomass utilization, the Bureau of Land Management (BLM) manages 65 million acres of woodlands and forests. BLM is building stewardship contracting to improve forest health, looking at marketing and transportation barriers, and offering 146,000 tons of biomass for sale in 2012 and 26 stewardship contracts. These projects can provide useful woody biomass for projects like those being discussed by the task force.

Mr. Farquhar also provided a short overview of DOI involvement in conventional energy resources in onshore and outer continental shelf resources.

David Nothmann asked why there are not more biomass projects on federal lands. Mr. Farquhar indicated that it does not generally initiate projects on public lands but reacts to proposals presented by applicants, and he is hopeful that more biomass developers will be interested in the public lands. He said state-level staff could work closely with possible applicants to discuss potential biomass projects on the public lands. However, he stated that federal land projects, unlike most on private or state lands, must meet National Environmental Policy Act requirements, which can make the development process more protracted and expensive. Mr. Farquhar suggested there might be an opportunity for projects to

mix biomass from federal lands with pulverized coal for combustion at coal plants, but Harry Boumus from USDA stated that biomass feedstocks from federal lands are prohibited by **the** Energy Independence and Security Act of 2007.

Sharlene Weatherwax, Associate Director of Science for Biological and Environmental Research (BER) at DOE's Office of Science, provided an overview of the DOE Bioenergy Research Centers (BRCs), the Genomic Science program, the USDA-DOE Plant Feedstock Genomics for Bioenergy, the Environmental Molecular Sciences Laboratory (EMSL), and the Joint Genome Institute (JGI).

The BRCs work to gain a fundamental understanding of sustainable bioenergy crop production; plant metabolism and techniques to decrease biomass recalcitrance; pretreatment methods to increase the efficiency of cellulose extraction; and modifications to microorganisms to combine conversion capabilities, tolerate biofuel production conditions, and produce a range of biofuel compounds. All three BRCs have industry partners, collaborators, advisors, intellectual property and technology licensees, and spin-offs. BRCs have reached out to the bioenergy industry, creating links for future commercialization.

The Genomic Science program's objectives are to determine the genomic properties, molecular and regulatory mechanisms, and resulting functional potential of microbes, plants, and biological communities central to DOE missions. It also develops the experimental capabilities and enabling technologies needed to achieve a genome-based, dynamic, system-level understanding of organism and community functions, along with developing the knowledgebase, computational infrastructure, and modeling capabilities needed to advance the understanding, prediction, and manipulation of complex biological systems. In fiscal year (FY) 2012, eight awards were made in response to *the Biosystems Design to Enable Next-Generation Biofuels* FOA. Another FOA is planned in the fall of FY 2013 on *Genomic Science for Bioenergy and the Environment*, pending availability of funding.

The USDA-DOE Plant Feedstock Genomics for Bioenergy is a joint competitive grants program initiated in 2006—led by the DOE-BER and USDA-National Institute of Food and Agriculture (NIFA)—to focus on genomics-based research, leading to improved use of biomass and plant feedstocks for the production of fuels such as ethanol or renewable chemical feedstocks. In FY 2012, nine competitive awards were made. In FY 2014, a solicitation is pending the availability of funding.

The Systems Biology Knowledgebase (Kbase) was rolled out in February 2012 and is solving grand challenges in biology for energy and the environment by allowing easy access, manipulation, analysis, and sharing of large-scale "omics" data. It is an open-source and open-architecture computational environment for integrating large, diverse datasets generated by the Genomic Sciences program and other sources, and using this information to advance predictive understanding, manipulation, and design of biological systems.

EMSL and JGI held their first-ever joint call for proposal to focus on plant, fungal, soil, and microbial interactions and physiology related to biofuel production and carbon cycling. Proposals must require capabilities from both facilities. Projects are anticipated to start on October 1, 2013.

Bill Provine commented about how pleased he was with the Office of Science programs. He asked what could be done better to improve the sharing of intellectual property. He also asked about what the BRCs would do in their second term. Dr. Weatherwax stated that the research centers were very much academically focused, and information sharing primarily happened at applied research conferences, such as the biomass annual confernce sponsored by BETO. She also stated that the research centers' first term research was primarily focused on discovery and their second term plans would build on the first term results.

## VI. Integrating Feedstocks Development and Production with Conversion Processes and Distribution Across the Supply Chain to Improve and Accelerate Biofuels Commercialization

*Bryce Stokes, Senior Advisor, CNJV, on behalf of the Biomass Board Working Group*

Bryce Stokes, Senior Advisor from CNJV, presented on behalf of the Biomass Board Working Group on the development of a white paper on integrating across the supply chain the feedstocks, conversion, and distribution components. The white paper will focus on improving full integration and achieving higher efficiency in the production, conversion, and delivery of biofuels. The report will discuss a science and technology review of the role of biomass feedstocks' physical and chemical properties and material flow through the supply chain for improved efficiency. It will provide information on some primary parameters that affect the whole supply chain, as well as identify the barriers and understanding of the implications of fully integrating feedstock development, production, and handling with conversion and delivery of final products. It will evaluate and make recommendations for improving supply chain components, overall system efficiency, and cost competitiveness, and also facilitate coordination among the federal agencies to improve the supply and end-use chain to take advantage of technology breakthroughs. Work on the white paper is coordinated through representatives from DOE, USDA, the Environmental Protection Agency (EPA), the Department of Transportation, and the National Science Foundation. The white paper team has been meeting since February 2013, and the concept was presented at the June Biomass Board meeting. The first draft was completed for reviewers in July 2013 and is currently under review. The final white paper will be presented to the Biomass Board at the December Board or later meeting.

David Bransby asked if the white paper would consider looking at small-scale facilities and if the Working Group would address some of the issues. Mr. Stokes said that the white paper is focusing more on material flow, but he will take the small-scale issue back to the Working Group for consideration.

Huey-Min Hwang asked if the white paper is looking at algae. Alicia Lindauer from DOE stated that they reached out to the Algae Working Group, but they did not participate due to their current focus on other activities.

## VII. Federal Initiatives for Aviation Fuels

- *Chris Tindal, Director for Operational Energy, U.S. Navy*
- *Harry Baumes, Director, Office of the Chief Economist, U.S. Department of Agriculture*

- *Zia Haq, Defense Production Act Coordinator, U.S. Department of Energy*

Chris Tindal, Director of Operational Energy for the U.S. Navy, provided an update on the Defense Production Act (DPA) Title III Advanced Drop-In Biofuels Production Project for the Navy. As of June 19, four Phase 1 awards have been made. These projects have the potential for 170 million gallons of drop-in compatible military specification fuels (F-76, JP-5, 8) to start production by 2016. The weighted average price in 2013 dollars is expected to be less than $4 per gallon. The project has $100 million in FY 2012 funds from the Department of Defense and $60 million in FY 2013 funds from the U.S. Navy that can't be reprogrammed. USDA has contributed $161 million in funds. Phase 2 awards are set to begin in July 2014 and will focus on construction and commissioning.

Harry Baumes from USDA provided an overview of the Farm to Fly 2.0 (F2F2) initiative. Key remaining issues to achieve biofuels for aviation are feedstock supply chain development and bridging the valley-of-death on investment and deployment. The initial Farm to Fly initiative aimed to "accelerate the availability of a commercially viable and sustainable aviation biofuel industry in the United States, increase domestic energy security, establish regional supply chains, and support rural development." It involved collaboration between USDA, Airlines for America, and Boeing. USDA focused on feedstock development relevant to jet fuel production and leveraged projects and regional activities. F2F2 looks to address additional challenges, including feedstock costs comprising the majority of fuel cost, supply chain immaturity being a critical risk to near-term scale, and financial risk mitigation needs. F2F2 commitments include the following:

(1) Work together to assess and propose means for meeting our mutual goal through regional/local assessments, and studies of potential bio-jet fuel production projects

(2) Address requirements needed for sustainable scale-up of several promising feedstocks

(3) Serve as a vehicle for enhanced communication and coordination.

Early work elements of F2F2 include individual feedstock summits hosted by Biomass Research and/or NIFA/Agriculture and Food Research Initiative (AFRI) Centers to establish benchmarks, develop state teams, and develop baseline scenarios/forecasts that substantiate ability and opportunities to achieve goals.

Zia Haq from DOE Bioenergy Technologies Office provided an overview of the Department's aviation biofuels activities. Mr. Haq started with an overview of the existing biorefinery projects. Currently, seven integrated biorefinery projects in the BETO portfolio are investigating hydrocarbons from biomass resources at the pilot or demonstration scale. As part of the DPA Memorandum of Understanding (MOU), DOE announced on April 22, 2013 four projects that were selected for negotiation for the *Innovative Pilot and Demonstration Scale Production of Advanced Biofuels* solicitation. Each project selected will be working to produce biofuels that meet military specifications for jet and/or diesel fuel. The awarded projects include the following:

- Frontline Bioenergy LLCM, Ames, Iowa

- Cobalt Technologies, Mountain View, California
- Mercurius Biorefining, Inc., Ferndale, Washington
- BioProcess Algae, Shenandoah, Iowa.

Additionally, DOE held an Aviation Biofuels Techno-Economic Analysis Workshop on November 27, 2012, to benchmark current and future cost-of-production and performance characteristics of biomass-based processes that can produce jet fuel. The workshop provided a unique opportunity for stakeholders to discuss the cost of biofuels production via multiple pathways. The workshop identified the following needs:

- Research results and data needs to be more broadly communicated; greater awareness of ongoing R&D is needed.
- As fuels are being qualified, costs should be considered. Fuel producers and key stakeholders should be brought into this process.
- Data from facilities under construction is difficult to obtain (intellectual property, etc.); however, it is needed to provide a reality check.
- Common terms, units, and techniques are needed for techno-economic analysis to enable consistent comparison of technologies.

## IX. Biomass Research and Development Initiative Update

*Dr. Sonny Ramaswamy, National Institute of Food and Agriculture Director, U.S. Department of Agriculture*

Dr. Ramaswamy provided an overview of the activities performed under NIFA. NIFA has a budget of $1.2 billion with 62 lines of authority. Approximately $800 million of NIFA's budget goes to the Land-Grant Universities, while $400 million is designated for competitive grants, including AFRI, the flagship competitive grants program, and Mandatory programs such as Specialty Crops, Organic Research, and BRDI. In the FY2014 budget, NIFA requested a 30% increase in AFRI funds, along with increases to focus on building capacity in the Land-Grant Universities and to support minority serving institutions. NIFA is currently cataloging a global landscape to support the bioeconomy.

## IX. Subcommittee Breakout Summaries

### Conversion

Problem: Advanced biofuels and bioproducts are still not economically competitive enough *(without subsidies)* against crude oil at $100 dollars a barrel to justify capital investment.

*Potential Solution*: Anything that displaces oil cost-competitively with some return for economics could qualify as a solution. A main metric that should be considered for selections should be economics in order to meet the challenge.

*Barriers*:

- Deoxygenation costs are too high—consider the role of natural gas;
- The ethanol blend wall is restricting capital investment;
- Cellulosic sugars are not cost-competitive with starch-based sugars;
- There is no policy to support bringing bioproducts to the market;
- There is a need to have efficient utilization of all components of biomass;
- Capital efficiency should be considered at scale.

*Recommend Path Forward*:

- DOE and other agencies should predominantly focus on R&D solicitations to reduce key cost hurdles.

- Fund targeted programs to address operational issues of early demonstration plants to meet the petroleum replacement goal.

## Infrastructure

Upstream Problem: Seasonal, variable, low-density feedstock.

Biomass material in the United States typically has three disadvantages as a feedstock for conversion into fuels:

(1) It is seasonal, meaning that it is primarily available at the end of the season in the fall.
(2) It is variable, meaning that its properties can be significantly different depending on the source.
(3) It has low density, meaning that the dry mass can be very low compared to its volume and that it may contain significant amounts of water, which usually has to be removed prior to processing.

To address the low-density issue, biomass densification and drying processes must be developed and implemented. Seasonality can require that biomass storage systems be developed so that plants can operate year-round. Alternatively, plants can use different feedstocks in different seasons. However, feedstock variability issues need to be overcome through pre-treatment or conversion process development.

The confluence of these three issues drives up costs for large-scale collection of feedstock because supplying a large facility would require feedstock to be moved long distances, increase feedstock variability, and require large-scale feedstock storage.

*Potential Solutions*:

- Smaller distributed feedstock processors/biorefineries
    - Having large numbers of small facilities results in short transfer distances and times for feedstock

    - Having large numbers of small facilities results in small-scale materials storage facilities to bridge between harvests
- Diverse products
- Technology integration
- Multiple feedstock refineries
    - Use different feedstocks seasonally
    - Flexible processes that can use different feedstocks
    - Pretreatment processes that produce consistent feedstock regardless of source

*Barriers*:

- Diseconomies of small-scale production
- Excessive capital costs of small-scale production
    - Cellulosic plants require significantly higher capital expenditure per gallon capacity than corn or sugar ethanol plants or biodiesel plants. This is due to more complex and numerous unit operations than conventional biofuel facilities. Traditionally, the solution to high capital cost is to increase scale by building larger facilities. In the case of feedstock processing plants and biorefineries, the costs of transporting biomass greater distances rises rapidly and can offset, or more, any savings from reduced per gallon capital expenditures. Further, higher capital costs increase perceived project risk and reduce the likelihood of getting funding.

*Paths Forward*:

- Analyze tradeoffs between large centralized processors/biorefineries and small distributed facilities.
- Identify processes where small scale has the greatest cost disadvantage relative to large-scale facilities.
- Identify ways to lower costs of small distributed plants.
- Identify ways to integrate technologies for small-scale plants.

*Examples*:

- Develop standardized small-scale process units that can service a variety of pathways and produce these standard units in volume to lower capital costs
- For solicitations, equipment manufacturers should be included in studies and landowners/feedstock suppliers should be included in demonstration plants.

## Feedstocks

Overall Theme: Maximize production/value per acre (virtual acre)

*Problem*: Not maximizing production of current acres. Acres are finite. Low energy density.

*Potential Solution*: Without adding additional acres, add production and value to existing acres. There need to be an integrated systems-level approach to satisfy food, feed, fuel, and bioproduct demands.

*Barrier*: Regional diversity. Fuel (British thermal unit per acre) production may not be profitable without additional bioproducts production. Not currently looking holistically at the agriculture system.

*Recommend Path Forward*:

- Interagency Grand Challenge or MOU.
- Regional approach.
- Match production to demand.
- Interagency extension service or other framing organizations.

Theme 1: Conversion Capable Waste Feedstock

*Problem*: Have not yet fully utilized waste streams.

*Potential Solution*: More emphasis needs to be placed on waste streams; should use waste as a first step.

*Barrier*: Limited federal research on pre-processing of waste materials. Current process is very manual. Feedstock specifications by conversion facilities are not standardized (applies to all feedstocks).

*Recommend Path Forward*:

- Research around pre-processing waste.
- Development of specifications for wastes feedstocks.

Theme 2: Underutilized Land

*Problem*: Lack of understanding of underutilized land for biomass.

*Potential Solution*: Maximize use of underutilized land for biomass production.

*Barrier*:

- Unknown inventory of underutilized land.
- What is public and private.
- Federal and state tax laws.
- Lack of understanding of the impacts of land-use change. Definition of underutilized land.

*Recommend Path Forward*:

- Study and analysis to develop a database of underutilized lands (the State of Florida is an example).
- Systems approach to categorizing land.
- Review of federal and state tax laws.

- Involve agencies that own land (i.e., BLM).

## X. Public Comment

Email Submitted Wednesday, July 31, 2013 6:58 PM

From: jean public
Subject: Fwd: public comment on federal register

the biomass acts was repealed. and that was good. therefore why do we still have this committee hanging on forever. biomass is not a good energy source. taxpayer got burned bad by ethanol, which takes more energy to make than it gives us. a real ripoff that one was. i think this committee acts to make agribusiness rich and the rest of us poor by makingdger product. i think this committee should be shut down. i think the budget of this committee should be zero. old committee in govt never die they just go on for eternity doing nothing worthwhile but spending our tax dollars wastefully. this comment is for the public record. please acknowledge receipt. jean public

## XI. Closing Comments

Meeting was adjourned.

## Attachment A: Committee Member Attendance — August 14–15, 2013, Meeting

| Co- Chairs | Affiliation | Attended? |
|---|---|---|
| Ronnie Musgrove | Former Governor, MS | Yes |
| Kevin Kephart | South Dakota State University | Yes |

| Members | Affiliation | Attended? |
|---|---|---|
| Dean Benjamin | NewPage Corporation | Yes |
| David Bransby | Auburn University | Yes |
| Paul Bryan | UC-Berkeley | Yes |
| Pamela Reilly Contag | Cygnet Biofuels | No |
| Steve Csonka | Commercial Aviation Alt. Fuels Initiative | Yes |
| Harrison Dillon | Solazyme | No |
| Claus Crone Fuglsang | Novozymes North America, Inc. | Yes |
| Neal Gutterson | Mendel Biotechnology | No |
| Huey-Min Hwang | Jackson State University | Yes |
| Joseph James | Agri-Tech Producers, LLC | Yes |
| Coleman Jones | General Motors | Yes |
| Craig Kvien | University of Georgia | No |
| Kit Lau | BioAmber Inc. | Yes |
| Johannes Lehmann | Cornell University | No |
| Jay Levenstein | FL Dept. of Ag. and Consumer Services | Yes |
| Stephen Long | University of Illinois | No |
| Maureen McCann | Purdue University | Yes |
| Bruce McCarl | Texas A&M | No |
| Christine McKiernan | BIOFerm Energy Systems | Yes |
| Ray Miller | Michigan State University | Yes |
| Neil Murphy | State University of New York, | No |
| David Nothmann | Battelle | Yes |
| Jimmie Powell | The Nature Conservancy | No |
| William Provine | Dupont | Yes |
| James Seiber | University of California | Yes |
| Abolghasem Shahbazi | North Carolina A&T State University | No |
| Don Stevens | Cascade Science and Tech. Research | Yes |
| John Tao | O-Innovation Advisors LLC | Yes |
| Alan Weber | MARC-IV Consulting / Weber Farms | Yes |
| Todd Werpy | Archer Daniels Midland Company | Yes |

**Total: 22 of 32 members attended**

## Attachment B: Agenda — August 14–15, 2013

**Day 1: Technical Advisory Committee Meeting August 14, 2013**

| | |
|---|---|
| 8:00 a.m. – 8:30 a.m. | *Breakfast (to be provided for Committee)*<br>*Room A* |
| 8:30 a.m. – 8:40 a.m. | Welcome<br><br>*Committee Co-Chairs* |
| 8:40 a.m. – 9:00 a.m. | Presentation: DOE Updates<br>*Elliott Levine, DFO, U.S. Department of Energy* |
| 9:00 a.m. – 9:20 a.m. | Presentation: USDA Update on Biomass R&D Activities<br>*Todd Campbell, Energy Policy Advisor, U.S. Department of Agriculture* |
| 9:20 a.m. – 9:50 a.m. | Presentation: Subcommittee Instructions Toward End of the Year Recommendations<br>*Committee Co-Chairs* |
| 9:50 a.m. – 10:35 a.m. | Presentations: Overview of Selected Biomass R&D Programs<br>○ *Federal Aviation Administration, James Hileman, Chief Scientific and Technical Advisor for Environment and Energy*<br>○ *Department of Interior, Ned Farquhar, Deputy Assistant Secretary for Land and Minerals Management* |
| 10:35 a.m. – 10:50 a.m. | *Break* |
| 10:50 a.m. – 11:40 a.m. | Presentation: Board Working Group White Paper Effort<br>*Bryce Stokes, Senior Advisor, CNJV, on behalf of the Board Working Group* |
| 11:40 a.m. – 12:00 p.m. | Public Comment |
| 12:00 p.m. – 1:00 p.m. | *Lunch (to be provided for Committee)* |
| 1:00 p.m. – 1:45 p.m. | Discussion: Federal Initiatives for Aviation Fuels<br>○ *Chris Tindal, Director for Operational Energy, U.S. Navy*<br>○ *Harry Baumes, Director, Office of the Chief Economist,* |

*U.S. Department of Agriculture*
- *Zia Haq, DPA Coordinator, U.S. Department of Energy*

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| 1:45 p.m. – 2:15 p.m. | Discussion: Subcommittee Instructions Continued<br>*Committee Co-Chairs and Full Committee* |
| 2:15 p.m. – 4:45 p.m. | Breakout: Subcommittees<br>*Rooms A,B,C* |
| 4:45 p.m. – 5:15 p.m. | Presentation: Biomass Research and Development Initiative (BRDI) Update<br>*Dr. Sonny Ramaswamy, NIFA Director, U.S. Department of Agriculture* |
| 5:15 p.m. – 5:30 p.m. | Discussion: Day 1 Subcommittee Report Outs |

**Day 2: Technical Advisory Committee Meeting August 15, 2013**

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| 8:00 a.m. – 8:30 a.m. | *Breakfast (to be provided for Committee)*<br>*Room A* |
| 8:30 a.m. – 9:15 a.m. | Presentation: Overview of Selected Biomass R&D Programs (Continued)<br>*Bioenergy Science Centers, Sharlene Weatherwax, Associate Director of Science for Biological and Environmental Research, DOE* |
| 9:15 a.m. – 10:30 a.m. | Breakout: Subcommittees<br>*Rooms A,B,C* |
| 10:30 a.m. – 11:30 a.m. | Discussion: Day 2 Subcommittee Report Outs |
| 11:30 a.m. – 12:00 p.m | Discussion: Next Steps and Preparation for 4th Quarter Meeting |
| 12:00 p.m. – 12:15 p.m. | Public Comment |
| 12:15 p.m. – 12:30 p.m | Closing Comments<br>*Committee Co-Chairs* |
| 12:30 p.m. – 1:30 p.m | *Lunch (to be provided for Committee)* |
| 1:30 p.m. | Adjourn |